Frank Press and Congress

The President's science adviser is told he should make an institution of himself

"Don't believe everything you hear about my not cooperating with Congress," Frank Press said, hoping to nip some bad publicity in the bud. Press, the director of the White House Office of Science and Technology Policy (OSTP), spoke with *Science* on 22 March, the day after he spent 2½ hours as the sole witness in hearings before the Senate subcommittee on science, technology, and space. Senators Adlai Stevenson III (D-Ill.), the chairman, and Harrison Schmitt (R-N.M.), the ranking Republican, asked Press to respond to the charge that he neglects to keep Congress and the public fully informed of the nation's science policy.

This criticism was made in two brief reports filed with the subcommittee, one written by the Congressional Research Service and the other by the American Society for Public Administration. The burden of the two papers is that OSTP is avoiding its congressionally mandated duties to set out its intentions in annual reports and a 5-year prospective outlook; that it is failing to solicit public and congressional advice in the manner Congress intended; and that important institutional chores have been neglected while Press and his colleagues deal with daily crises.

In the hearing, Press dismissed this criticism as superficial. He asked, "What better way is there to institutionalize an office than making OSTP an office which the President himself takes seriously?" Later, Press said that he thought the demand for policy statements comes from "science policy buffs who would like to get a report a month to hand out to their classes." His position is that OSTP has more important things to do—an attitude that annoys congressional staffers.

Presidential advisers are not accountable to Congress, but Press finds himself in something akin to a Cabinet position in that he serves simultaneously as a confidential adviser to the President and as the director of a congressionally created office. As the director of OSTP, he must report to Congress, but as a presidential adviser, he dare not report too thoroughly. Press clearly views his confidential role as being by far the more important one, and for this reason he does not jump through all the hoops that his overseers on Capitol Hill set out for him.

Press will celebrate his second anniversary in office on 29 April. He is also enjoying what he considers his greatest accomplishment since coming to Washington, his recent victory in the federal budget scramble for 1980, which ensured that basic research funding will not be affected by the cutbacks being made throughout the government. Because of Press's campaign, almost every agency has given Congress a proposed budget that will either keep constant or increase basic research funding. Press said that it was not difficult to win this concession, "once the issue had been brought to the President's attention." Carter immediately agreed. Press observed, "We had more problems with the agencies, getting them to rank basic research high on their ZBB lists," referring to the management gimmick (zero-based budgeting) that this Administration uses in setting priorities.

Press claimed several other accomplishments. One was the joint project

Carter Sends Congress a Science Message

President Carter's message on science and technology, an appeal for a "nonpartisan investment" in basic research and high-risk demonstration projects, was delivered to Congress on 27 March, about a week later than originally planned. Complications in the Mideast negotiations caused the delay. Its stated purpose is to win congressional support for the Administration's view that the nation's prosperity will rise or fall with its investment in research, and that the federal government has a critical responsibility to provide that investment.

In a grandiloquent justification of this thesis, Carter's message states: "The health of our economy has been especially tied to science and technology; they have been key factors in generating growth, jobs, and productivity through innovation. Indeed most of the great undertakings we face today as a nation have a scientific or technological component." And that is why, the Administration says, it has sought a 26 percent increase in basic research funding over the last 2 years.

For all the fanfare, the report contains little that is new or distinctive. Indeed, it does not propose a single legislative initiative. It serves instead as a global summary of projects already begun:

- The six domestic objectives include promoting industrial innovation and efficiency, bringing about a revolution in energy supply and use patterns, funding biomedical research and improving health medical research and improving health care (although the sums are not likely to increase as rapidly in this area as Congress would like), improving the scientific basis of federal regulation, maintaining American leadership in space exploration, and developing better methods for averting deaths from such natural disasters as floods and earthquakes.
- In international affairs, Carter will pursue cooperative schemes for geophysical, environmental, and energy research. Technological exchange programs will be used also as a means of improving relations with China, the Soviet Union, and the developing world, with particular emphasis in the next year on the proposed Institute for Scientific and Technological Cooperation. This revision of the foreign aid program has not yet been debated by Congress.
- In support of national defense, Carter states, he has proposed an average increase in funding for military research and development of 14 percent a year for the last 2 years. No specific new projects are mentioned.
- In the final category, Carter makes a number of general promises to improve relations between the universities and the government, to fund experimental projects involving industry people at universities, and to consult more often with state and local officials about their technological needs.—E.M.

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Judge Halts H-Bomb Article

Commenting that it will make him notorious, Robert Warren, the federal district court judge in Milwaukee, on 26 March issued the first prior restraining order for a publication in U.S. history: He told *The Progressive* magazine it could not publish an article describing the design of the U.S. hydrogen bomb. The magazine's editors say they will appeal this infringement of their constitutional rights.

Warren sided with the government, he explained, in view of the "disparity of risk" involved in this confrontation between national security and freedom of the press. If he made a mistake favoring the government, there would be some infringement of the magazine's First Amendment rights. But if he made a mistake favoring the magazine, and let the article be published, the result could be "a threat of thermonuclear disaster to us all," he said.

Judge Warren evidently concluded that the information in the article constituted a genuine secret under the terms of the 1954 Atomic Energy Act. Lawyers for *The Progressive* had argued that the act's language was too vague to apply, since it restricts "dissemination" of "all data" related to atomic weapons. *The Progressive* argued, moreover, that the information was not secret, since the author, Howard Morland, had gathered it from unclassified sources and with the government's help (*Science*, 30 March, p. 1323).

Curiously, both the government's claim that the material in the article is a national secret and *The Progressive*'s claim that it is not, may be true. This is because what writer Morland deduced are not only the general principles of the H-bomb but the unique configuration that has made the H-bomb practical. Developed in 1951, this design transformed the American H-bomb program from a batch of unworkable possibilities into what J. Robert Oppenheimer called a "sweet" problem. The design was based on an insight by mathematician Stanislaw M. Ulam and developed in further work between himself and Edward Teller. As Herbert F. York, a participant in the program, wrote in 1976, "There is only one truly central technological fact in all this that still remains secret, and that is the precise nature of the Teller-Ulam invention of 1951."*

Oppenheimer described the importance of the invention to the U.S. program thus:

> The program we had in 1949 was a tortured thing that you could well argue did not make a great deal of technical sense. It was therefore possible to argue also that you did not want it even if you could have it.
>
> The program in 1951 was technically so sweet that you could not argue about that. The issues became purely the military, the political, and the humane problems of what you were going to do about it once you had it.†

The invention led immediately to test programs, code-named IVY and CASTLE, which resulted in the first H-bomb explosion, in November 1952, code-named "Mike." Since the Teller-Ulam secret made "Mike" possible, it caused other nations to learn that the H-bomb was not only theoretically, but practically, feasible.

In a friend-of-the-court brief, Lawrence Livermore scientist Hugh E. DeWitt says the portions of the Morland article the government wants deleted "describe very qualitatively the Teller-Ulam idea which led to the first successful hydrogen bomb explosions by the United States in the early '50's. This 'secret' has been regarded for over 25 years as highly classified. Yet there is by now enough information in open publications that a capable physicist could deduce the basic idea for himself. . . . [A]nd I understand that this is in fact what Morland has done."

Ironically, it may have been the government, rather than the press, who nearly gave away the "secret" of the H-bomb. For, while Morland or someone else might have deduced this particular design from unclassified sources, the fact that this particular design is uniquely useful was not known until the government started trying to suppress the article. In their affidavits, government witnesses say, in effect, that this is the correct design, and so may have given the game away.—DEBORAH SHAPLEY

**The Advisors: Oppenheimer, Teller and the Superbomb* by Herbert F. York. W. H. Freeman and Co. San Francisco 1976 $6.95. 175 pp. p. 8. †*Ibid.*, p. 81.

with Zbigniew Brzezinski's National Security Council (NSC) for scheduling a series of trips to China leading up to recognition of the Peoples Republic. "We tracked developments in China almost on a weekly basis . . . and at the right moment I told them [the NSC] that in our estimation China is ready to receive a delegation of senior officials." Brzezinski, along with Benjamin Huberman, who works for both OSTP and the NSC, went to China in May to propose a series of exchanges. Press made a trip in July with a group of top-ranking federal research officers. Visits accelerated from then on, culminating in the signing of formal agreements in January.

Other major projects that Press mentioned included the proposal to create an Institute for Scientific and Technological Cooperation—an agency for sharing technology with developing countries—and a high-level review of the problems in industrial innovation. He brought out a handwritten list of more than 20 lesser projects that he had scribbled on the back of his written testimony for the Stevenson committee—a note to himself to which he meant to refer when answering criticism of his leadership.

Despite these successes within the Executive Branch, Press is being asked to take a more active public role, a summons which he regards with no enthusiasm.

Press is a slightly built man, careful, and "retiring," as one friend described him. He was a distinguished geophysicist and chairman of the earth sciences department at the Massachusetts Institute of Technology (MIT) before moving to Washington. As the technical adviser of a technically minded President, he has good access to the Oval Office, "better than 99 percent" of those who seek the President's attention, Press said. But he remains an inconspicuous figure in the Executive household, one who consistently dodges controversy.

This is just as it should be, the OSTP staff believes. Eugene Skolnikoff, a political scientist at MIT and adviser to numerous science advisers, including the incumbent, said that Press's personality fits the job. "If I were forced to choose between a science adviser who never saw the light of day and a public spokesman, I'd certainly choose the former," Skolnikoff said. "Press sees his primary role as serving the President." Another member of OSTP, Philip Smith, said that Press knows that "he serves a constituency of one." Smith added that people with a large ego do not last long at the White House. It is true that one does not get things accomplished in the White

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House by outshining the President, and Carter has set a particularly low personal example of flamboyance.

The OSTP has entanglements outside the White House, however. Congress rescued the office after its removal from the Nixon White House and established it on a new legal foundation in 1976. In return, Congress made certain demands for reciprocal benefits, the chief one being that it wanted regular written reports on what was going on. Congressional science committees would like to hear everything the President hears, but formally they required only that OSTP write an annual policy report and a 5-year outlook setting out goals. In the President's first reorganization in 1977, these two duties were quickly shucked off and given to the National Science Foundation (NSF). Authors of the legislation, and particularly the staff aides who worked on it, resented this circumvention of their design, just as they resented the President's decision to abolish the permanent advisory committee on science, which the law created. Congress did not block the reorganization, nor has it pressed its claims vigorously since then. But the resentment is still felt.

In the hearing on 21 March, Senator Stevenson lectured Press on the need for "institution-building" to ensure that OSTP will continue to serve as a go-between for the Congress and the President in future years when relations may not be as cordial as they are now. Stevenson singled out the first annual report on science and technology (written by the NSF last year) for special criticism. Congressional staffers called it an academic paper, evenhanded in its findings, but inadequate as a statement of conviction or intent. The American Society for Public Administration (ASPA) found it to be "not even a pale substitute for the document called for in the legislation . . . largely a restatement of earlier NSF reports and budget documents." According to ASPA, the paper should have focused on a few items and ranked policy issues by importance. Stevenson asked Press to respond.

Press agreed that the annual report had been a "disappointment" and promised that the next one would be better. An NSF official who worked on the document also told *Science* of his disappointment, explaining that NSF was not equipped to make policy statements. Similar problems loom ahead for the 5-year outlook, much of which is being written on contract by the National Academy of Sciences (this section will cost $344,000) and by individual experts outside the government. It is scheduled to be printed late in 1979. Partly to compensate for the inadequacy of the annual report, no doubt, and to satisfy the congressional critics, OSTP has drafted a presidential message on science and technology, scheduled for delivery on 27 March.

Press and his associates view the fuss over the reports as a special interest cause, fired by the demands of people who would like to create a policy bureaucracy just for science—institution builders, in Stevenson's term. Because Press saw this as a procedural rather than a substantive problem, the policy papers have received little attention until now. Press believes the OSTP should be criticized not on the basis of what it says it will do, but on what it does. Press has testified a score of times on Capitol Hill since his appointment, and reports that his office gives frequent briefings to congressmen and their aides. This ought to satisfy the hungriest policy hound, he believes.

Congressional staffers are puzzled by this attitude. Press ought to welcome the opportunity to discuss policy and rise above the "swamp" of daily crises, one said. Another found OSTP's casual attitude "arrogant" and went so far as to invoke the shade of Richard Nixon.

There is little evidence of this dissatisfaction outside the congressional oversight committees. Watchers of the science establishment are quite tame on the subject. Michael Jacobson, director of the Center for Science in the Public Interest, found OSTP "too bureaucratic" to bother with. Jeremy Stone, executive director of the Federation of American Scientists, said that Press was "impressive," and that he was genuinely open to new ideas. Alan McGowan, head of the Scientists' Institute for Public Information, faulted Press for being overly cautious and failing to stimulate a popular campaign in support of the SALT treaty. He considered Press otherwise excellent.

When asked to discuss his difficulty with Congress, Press said that the notion that he was mired in crisis management was simply wrong, as was the charge that he refused to speak up about broad policy issues. Unlike the public figure, the private man speaks with animation, although always with discretion. How does politics suit him? "I wouldn't say that I find any pleasure in it, but I don't abhor it either," Press said. What was the most unexpected part of the job? The sheer physical effort, he said. Six days a week he rises at six o'clock, runs, breakfasts at the White House at seven, and returns home at a quarter to eight in the evening. Has he ever discussed flying saucers with the President, a certified UFO witness? "No. I would avoid that like the plague." Press said that Carter has not raised this subject, but he has asked about black holes in space.

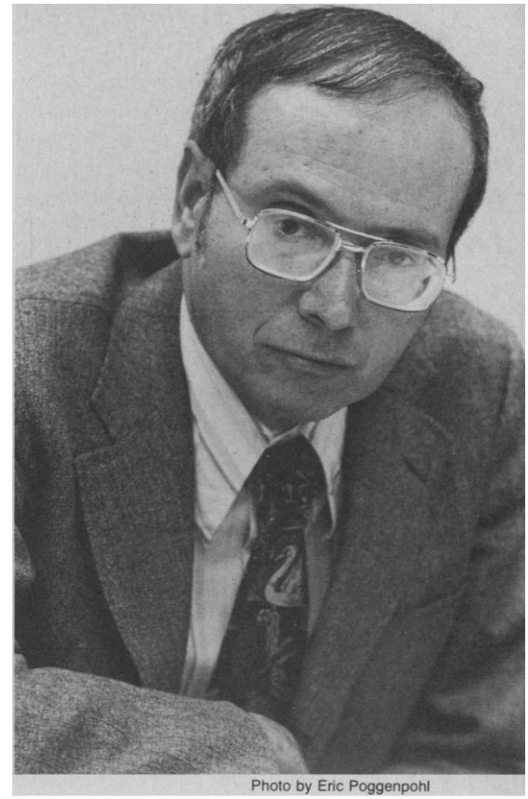

Photo by Eric Poggenpohl

Frank Press

There are two major differences between the OSTP today and its predecessors, according to Press. The first is that less emphasis is placed on space and military affairs. The space program is well established now and not in need of special attention. The Defense Department has become much more sophisticated about buying weapons systems than it was in the past. The DOD has recruited a top-notch civilian staff of analysts and given them authority, Press said. Occasionally a proposal comes along that requires independent review, and when this happens, OSTP steps in. There are some Pentagon projects that are not amenable to debate within the organization. A current example is OSTP's review of the MX missile program, which Press, with customary discretion, would not discuss. In Press's view, the OSTP has a much broader assignment than in the past. It must become more involved in domestic programs for protecting health and safety. It has a singular duty, he said, to review the scientific basis of federal regulatory policies.

A second major difference in the office, Press said, is that he does not find

himself playing the adversary as his predecessors did. He said he could not think of a single agency or person with whom he had to do battle. He did not know whether this reflected on his personal style, or on Carter's style of governing.

Press and his associate, Smith, said that the abolition of the standing advisory committee made no significant change in the way they communicate with the outside world. "We get 100 calls a day in this office," Press said, and a lot of free advice. The OSTP keeps a roster of 200 consultants from whom it seeks specialized advice. The system differs very little in practice, Smith said, from the methods used in earlier years.

Press said that his chief statement of policy is his effort to increase the federal investment in basic research. One might not guess it from the senatorial rhetoric, but this policy is by now familiar to Congress, and not entirely welcome. In part, the resistance stems from the fact that the increase in basic research funding is being made at the cost of funding for demonstration projects. Industries that thrive on demonstrations do not necessarily thrive on research, and for this

Holoart: Playing with a Budding Technology

As the 20th century advances, the flirtation of art with advanced technology has become more pronounced, as in computer-generated pictures and electronic music. Much of this is not particularly successful, for the more complex the technology the more skill is required to bend it to the will of the artist. Too often, it is the technology and not the art that becomes the message.

Holography, the technique of creating three-dimensional images with light, has over the past decade become a medium that holds considerable fascination for a small number of artists in this country and abroad. "Holoart," as it has been called, has about 200 practitioners in this country, and their efforts are being reinforced by New York's Museum of Holography, which opened at the end of 1976.

Last month the museum, located on Mercer Street in Manhattan's Soho district, was the setting for a daylong seminar on "Holographic art: policies for a new art form," at which people connected with various aspects of the arts discussed questions that included: "Is holography an art form?" (it certainly can be and in some cases is), "What's unique about it?" (it can do things nothing else can), and "How do we get money to support it?" (with difficulty).

As a technology, holography has not yet matured despite the elaborate visions some had for it in the 1960's. The technique was developed in 1948 in England by Dennis Gabor, who won the Nobel Prize in physics for it in 1971. Briefly, it entails splitting a coherent light beam into two beams, one aimed at the object and one at a photographic plate or film. The light reflected from the object and the beam aimed at the plate meet at the plate, where they create an interference pattern. When a coherent light beam is later shone through the plate, the image of the object is created in three-dimensional form. Research on holography received its impetus with the development of lasers in 1960. In 1962 Emmet N. Leith and Juris Upatnieks of the University of Michigan created the first holograms with lasers. There was big talk in the 1960's about the potential for holograms—particularly in advertising and displays—and holographic television, which would make the set look like a tiny stage, was seen as a tantalizing possibility.

But even as the failure of exaggerated expectations in view of the limitations of the medium caused research in holography to subside in the early 1970's, artists were developing an interest. In 1968, Stephen Benton of Polaroid Research Laboratories developed a way to reconstruct holographic images by use of white light (such as that from an ordinary light bulb) instead of laser light, which made display much easier. Others figured out how to reduce the high cost of equipment for making holograms with homemade "vibration isolation tables" (a hologram has to be made on an absolutely still surface because movement of even one-fourth of a light wave can destroy the process) and cheaper optics. The medium was expanded with the development of pulsed lasers that have infinitesimal exposure time, useful for live subjects or outdoors, and methods for transforming a film of a moving object into a three-dimensional image that moves as the viewer circles the display.

There is still much technical work to be done to make the medium as versatile as artists might wish. One impediment is scale—a holographic image can be no larger than the plate that contains the information—and a major challenge is the development of holograms that reproduce the original colors. A laser, transmitting light of the same wavelength, produces a monochromatic image; holograms illuminated with white light have blurry horizontal "rainbow" stripes because of the different frequencies.

A look at the holograms in the museum reveals an art form still in a rudimentary stage—founder and director Rosemary Jackson compared it to the daguerreotype phase of photography. The transparent holographic film is bent around a black background; one looks through the film, which is illuminated from below, and perceives images floating in space behind it. There were landscapes, dancers, computer-constructed forms, and a few surrealistic effects achieved by putting physical objects in the space behind the film which appeared to blend with the holographic image. Some of the images were blurry and disappeared instantly if they were not looked at from the right angle.

Holoart is a case of people attempting to combine an infant technology with an embryonic aesthetic, the artistic potential of which has scarcely been enunciated much less realized. Asked what was so unique about it, the artists at the meeting could say no more than that it does things that are impossible with any other medium. One particularly striking hologram, in England, is said to be a 3 by 5 foot image of a gun shooting a bullet through glass. Done with a pulsed laser, it captures the bullet in midair and a plume of gunsmoke issuing from the muzzle.

Experimental as the form is, holoart creates enormous interest wherever it is shown. According to Jackson, 200,000 people have visited the museum since its founding, and thousands flock to exhibits that have been sent around the country. It may be even more interesting as science than as art, for it illustrates principles that ordinarily have to be taken on faith. For example, it vividly demonstrates

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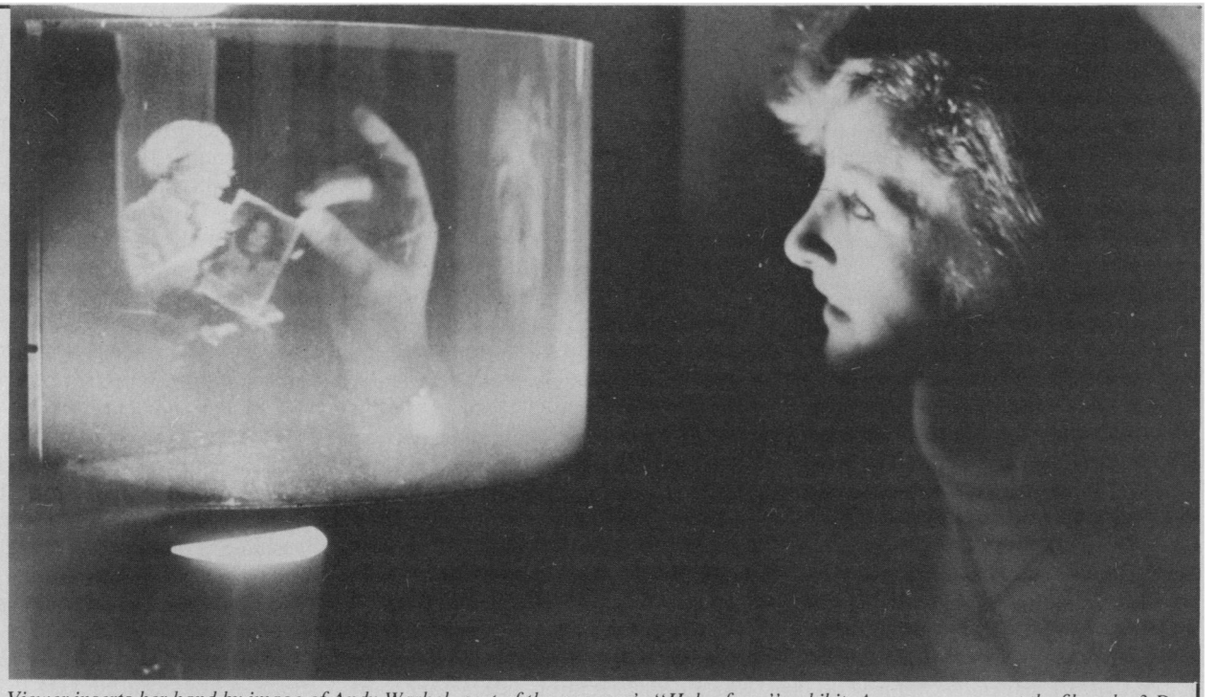
reason they see a flaw in the new policy.

In the oversight hearing on 21 March, Senator Schmitt suggested that it might be a mistake for the government to reduce its support for major demonstration projects. There may not be enough private capital to take up the slack, he said. Press disagreed, saying that the year-end profit reports for 1978 show that the problem is not a lack of private capital, so much as a lack of willingness to invest it. He did not agree that the government should use it scarce resources in 1980 to support developmental projects.

Stevenson's aides also have criticized the OSTP for being overly cautious with federal funds. They hold Press responsible for the Administration's decision not to push for a more rapid development of commercial ventures in space.

These complaints are much more substantive, although less clearly articulated, than the complaint that Press is devoting less time than he should to "institution building." They suggest that the real measure of Press's leadership will not be in the quality of his next annual report, but in his ability to defend the budget against congressional tinkering.

—ELIOT MARSHALL



Viewer inserts her hand by image of Andy Warhol, part of the museum's "Hol-o-fame" exhibit. As one moves past the film, the 3-D Warhol turns a page of the magazine.

that vision is an illusion, in that what the brain perceives are not objects but the light reflected from objects. It also demonstrates the different wavelengths of colors: according to Rick Silberman, a holographer at Brown University, an image made with a blue laser will appear smaller than the same image made with a red laser, because blue wavelengths are shorter than red ones. A hologram is also about the only way two objects can appear to occupy the same three-dimensional space at the same time.

Just as major scientific concepts such as relativity theory and the uncertainty principle have had an impact on all of 20th-century thought, some people believe holography can have an impact on the way we perceive the world. Brain researcher Karl Pribram of Stanford University, for example, has seized upon the hologram as a metaphor for the way the brain processes information. According to Pribram, the brain, like a hologram, performs an analysis of visual information and then projects an image into space. Another feature in common is redundancy. Just as memory and perception appear to be distributed around the brain—as evidenced by the fact that destruction of certain parts of the brain does not impair its function—so all the information in a hologram is contained in every part of it. This is because in holography, which is sometimes referred to as lensless photography, there is no focusing device, so light waves from all parts of the object hit all parts of the plate.

In a way, holography is an exciting new toy that no one quite knows how to make the best use of. So far, it has only one well-established commercial application—in nondestructive vibration testing of materials such as jet engines, where it can detect vibration that is indiscernible by other means. Many other uses are now being explored, as in creating displays of instrument panel readings over the window of an airplane cockpit so the pilot does not have to look down, and in holographic computer storage. In the longer term there is talk of holographic video telephones, and in the wilder realm are notions such as projecting the holographic image of a police car at a busy street corner.

Meanwhile, holartists are still trying to figure out how to get money to pursue their calling. Of some 200 holographers in the country, only four have managed to get grants. Others are regularly turned down—by the National Science Foundation because they are too arty, and by various art supporting agencies because they do not fit into any existing category. Private collectors stay away from holograms because as yet they are not regarded as an "investment." In some ways, the frustration is like that of scientists who want money to test a new hypothesis. Seed money is the most desperately needed kind, but holders of purse strings do not want to take risks on something whose promise is not yet proved.—CONSTANCE HOLDEN